

## Contoocook Annual Water Use versus Stream Flow – Calendar Year 2003

The Contoocook Designated River has two Designated branches—the mainstem and the North Branch. The North Branch was assessed as a separate Designated Reach, which then is incorporated into the mainstem assessment. The Contoocook Water Management Planning Area covers 764 square miles and includes two streamflow gages that were used in this assessment—USGS 01082000 CONTOOCOOK RIVER AT PETERBOROUGH, NH measuring 126 square miles of the WMPA and USGS 01085500 CONTOOCOOK R BL HOPKINTON DAM AT W HOPKINTON, NH measuring 427 square miles. In addition, a gage on the Warner River was used as a surrogate for the North Branch of the Contoocook, as described below. For this report the streamflow was transposed areal from the gages to all impact points on the Designated River. There are 57 registered sources and 15 registered, measured returns in the Water Management Planning Area.

The North Branch-portion of the Water Management Planning Area covers 121 square miles within the Contoocook Water Management Planning Area. A surrogate gage was used for the North Branch that more closely matches the size and conditions of the North Branch than do the gages at Peterborough and West Hopkinton. However, this data is an approximation, not an actual measure of North Branch stream flow. Data from the USGS 01086000 WARNER RIVER AT DAVISVILLE, NH measuring 146 square miles was used to generate stream flow values for the North Branch by proportion areal transposition. The North Branch watershed contains three registered sources and two registered, measured returns.

July was the only month in 2003 when the North Branch Contoocook Designated River was not in compliance with the General Standard. In July, the Designated River was not in compliance with the General Standard from the confluence of Beards Brook with the North Branch to the mainstem. Beards Brook drains Loon Pond which is used as Hillsborough's water supply.

In 2003, parts of the mainstem Contoocook Designated River were not in compliance with the General Standard during February, July, August, September and November. In July, the Designated River was not in compliance with the General Standard at several locations from beginning to end. During the other listed months, the river was not in compliance near the Jaffrey Water Works (20051-S03) and near the Monadnock Paper for a short reach of the river during September.

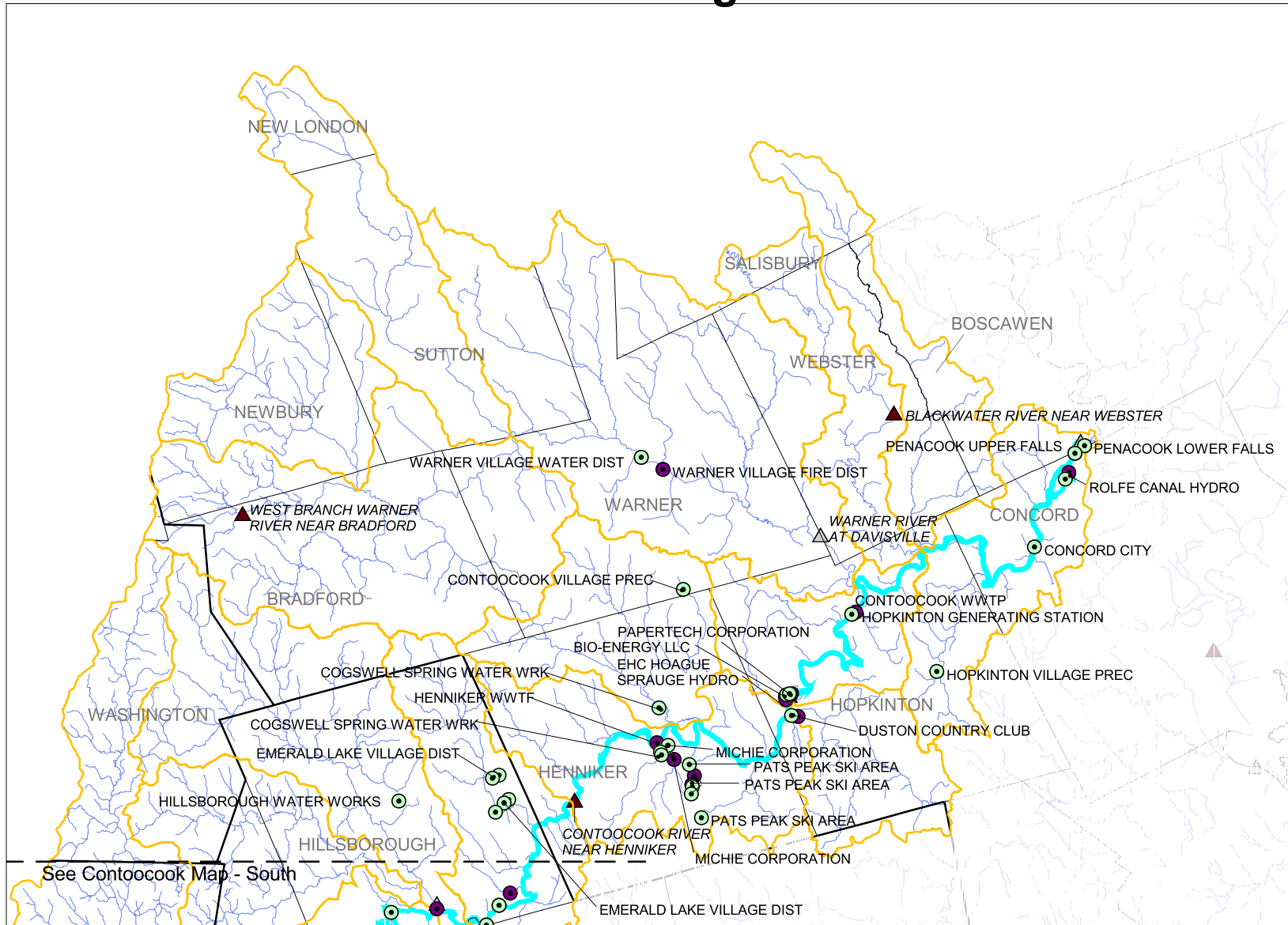
The General Standard usually increases continually from the headwaters to the end of the Designated reach. The Contoocook River is heavily regulated by dams on both the mainstem and its tributaries. The General Standard varies markedly on the Contoocook, in some months decreasing downstream and in others increasing more than during other months. This may reflect the variations in flow on the mainstem and from tributaries caused by storage and releases of water from impoundments.

The North Branch of the Contoocook River Water Management Planning Area has two hydropower sources. The Jackman Hydropower facility's intake is separated from its discharge location by 1.5 river miles. Water use by hydroelectric facilities are not shown in the monthly graphs because flow in is expected to equal flow out and because the General Standard does not apply to hydroelectric facilities between their point of withdrawal and point of return per Env-Ws 1903.02(d).

The Contoocook River WMPA has 15 hydroelectric dams registered with ten on the mainstem. Only the DD Bean and Son, Co. Inc. and EHC Hoague Sprauge Hydro facilities have returns separate from their intakes. There are 26 registered sources that are public water supplies, one bottled-water facility source and four industrial/commercial use sources. One source is used for bio-energy production. Irrigation for golf courses makes up five sources and snowmaking at Pats Peak uses four sources.

The Contoocook Designated River drains directly into the Upper Merrimack Designated River. The results of this assessment are a component of that river's assessment.

# Contoocook River Affected Water User Facilities: Source and Discharge Locations - North



## Legend

### Affected Water Users

- Source
- Discharge

### Stream Gages

- ▲ Active
- △ Inactive

### Designated Reach

- Hydrology

### State boundary

- Town boundary

### WMPA

See Contoocook Map - South

The coverages presented are under constant revision as new sites or facilities are added. They may not contain all of the potential or existing sites or facilities. NHDES is not responsible for the use or interpretation of this information. Not intended for legal purposes. Water users database last updated January 2004.

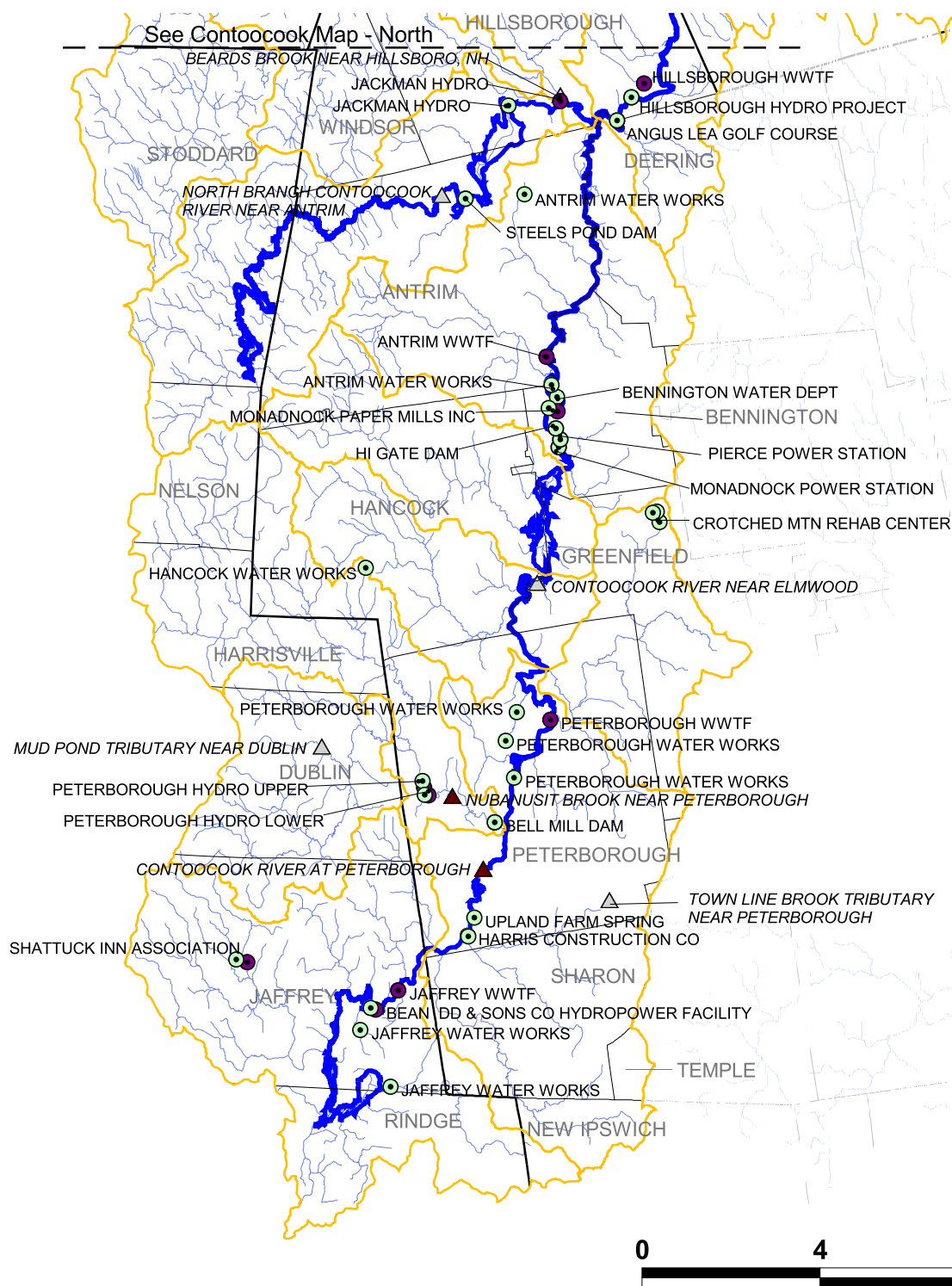
Map produced January 28, 2004

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0 1 2 3 4 Miles

# Contoocook River Affected Water User Facilities: Source and Discharge Locations - South



## Legend

### Affected Water Users

- Source
- Discharge

### Stream Gages

- Active
- Inactive



Designated Reach



Hydrology



State boundary



Town boundary



WMPA

The coverages presented are under constant revision as new sites or facilities are added. They may not contain all of the potential or existing sites or facilities. NHDES is not responsible for the use or interpretation of this information. Not intended for legal purposes. Water users database last updated January 2004.

Map produced January 28, 2004

2003 No. Br. Contoocook Water Use in CFS															
WU_NAME	FACILITY	WUSD_ID	DA on DR (SQ MILE)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Beginning of Reach North Branch Contoocook R.	Rye Pond		0.64												
STEELS POND HYDRO	STEELS POND DAM	20604 20604-S01	57.24	50.5	27.0	16.2	46.1	73.5	69.1	22.2	15.4	32.1	26.4	43.8	83.8
STEELS POND HYDRO	STEELS POND DAM	20604 20604-D01	57.24	(50.5)	(27.0)	(16.2)	(46.1)	(73.5)	(69.1)	(22.2)	(15.4)	(32.1)	(26.4)	(43.8)	(83.8)
PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	20149 20149-S01	63.01	117.1	32.1	106.7	284.5	108.3	100.3	0.0	41.8	29.9	128.4	235.1	224.3
PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	20149 20149-D01	120.04	(117.1)	(32.1)	(106.7)	(284.5)	(108.3)	(100.3)	0.0	(41.8)	(29.9)	(128.4)	(235.1)	(224.3)
HILLSBOROUGH TOWN	HILLSBOROUGH WATER WORKS	20355 20355-S01	120.04	0.46	0.45	0.53	0.46	0.45	0.44	0.53	0.46	0.44	0.43	0.39	0.41

2003 No. Br. Contoocook Aggregate Water Use in CFS															
WU_NAME	FACILITY	WUSD_ID	DA on DR (SQ MILE)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Beginning of Reach North Branch Contoocook R.	Rye Pond		0.64	0	0	0	0	0	0	0	0	0	0	0	0
STEELS POND HYDRO	STEELS POND DAM	20604 20604-S01	57.24												
STEELS POND HYDRO	STEELS POND DAM	20604 20604-D01	57.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	20149 20149-S01	63.01	117.1	32.1	106.7	284.5	108.3	100.3	0.0	41.8	29.9	128.4	235.1	224.3
PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	20149 20149-D01	120.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HILLSBOROUGH TOWN	HILLSBOROUGH WATER WORKS	20355 20355-S01	120.04	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.4	0.4	0.4
End of Reach North Branch Contoocook R	Confluence with Mainstem Contoocook		120.69	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.4	0.4	0.4

## USGS 01086000 WARNER RIVER AT DAVISVILLE, NH

DA(mi^2) 146

7Q10 (cfs) 5.5

	Mean of daily streamflows (2003) in cfs	Mean of monthly streamflows (POR) in ft3/s	Median of monthly means (cfs)	Calculated Monthly mean CFSM	General Standard in cfsm
Jan-03	126.5	187	150	0.87	0.02
Feb-03	104.5	196	160.5	0.72	0.02
Mar-03	527.7	417	369	3.61	0.04
Apr-03	724.1	808	795	4.96	0.16
May-03	362.9	389	403	2.49	0.04
Jun-03	175.8	177	148.5	1.20	0.04
Jul-03	30.2	66	40.75	0.21	0.0019
Aug-03	297.3	39	29.9	2.04	0.04
Sep-03	131.7	46	25.15	0.90	0.02
Oct-03	296.6	84	39.25	2.03	0.04
Nov-03	383.2	191	137	2.62	0.04
Dec-03	629.5	228	177	4.31	0.16

2003 daily data availability

99.7% = number of days with data in 2003 / 365 days

	Using POR average streamflow for this month
	Using interpolated values or POR average daily

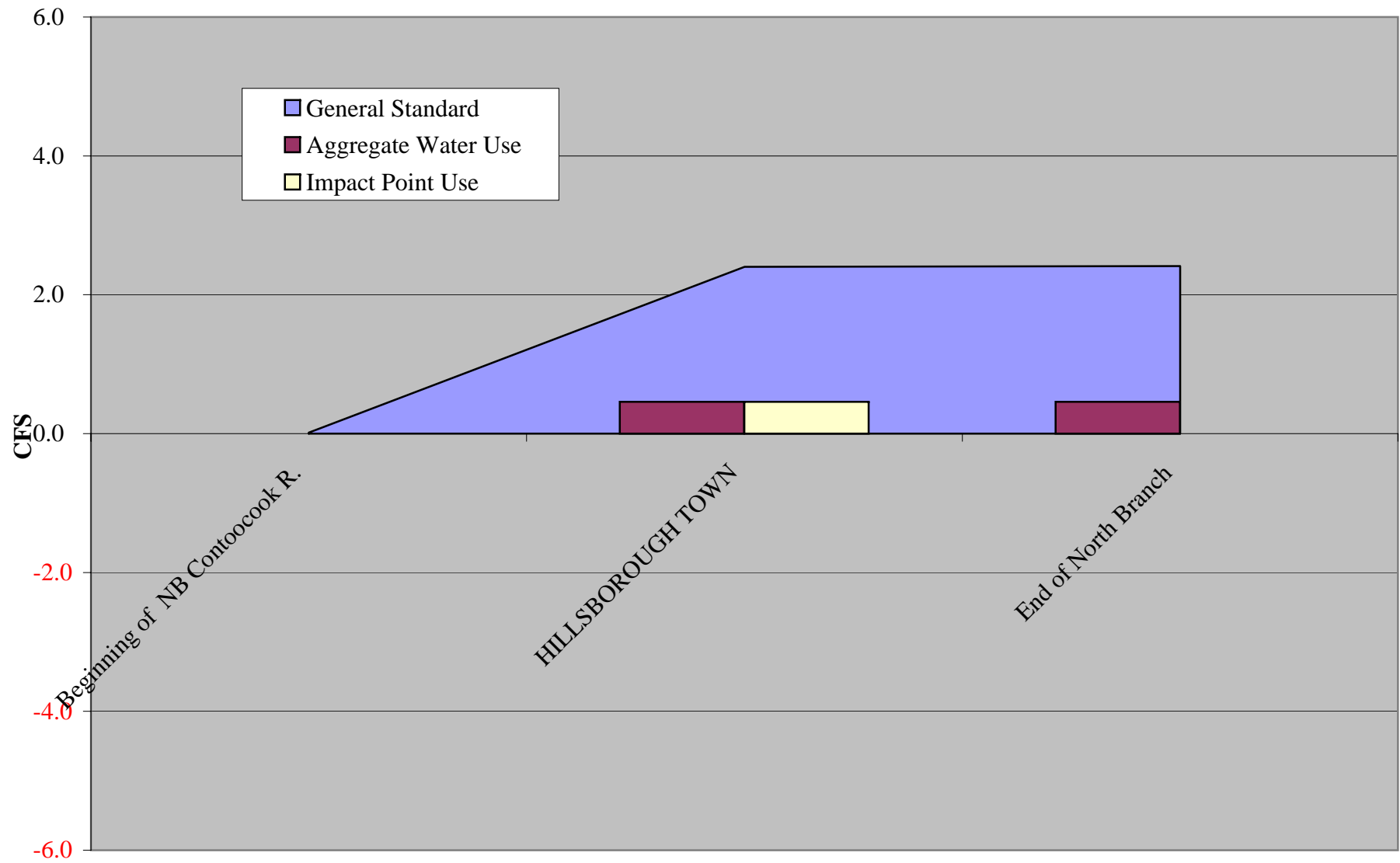
2003 No. Br. Contoocook Estimated Monthly Stream Flow at Each Impact Point in CFS	USGS 01086000 WARNER RIVER AT DAVISVILLE, NH	Calculated 2003 monthly mean streamflow in CFSM													
			145.4	0.87	0.72	3.63	4.98	2.50	1.21	0.21	2.04	0.91	2.04	2.64	4.33
WU_NAME	FACILITY	WUSD_ID	DA on DR (SQ MILE)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Beginning of Reach North Branch Contoocook R.	Rye Pond		0.64	0.6	0.5	2.3	3.2	1.6	0.8	0.1	1.3	0.6	1.3	1.7	2.8
STEELS POND HYDRO	STEELS POND DAM	20604 20604-S01	57.24												
STEELS POND HYDRO	STEELS POND DAM	20604 20604-D01	57.24	49.8	41.1	207.7	285.0	142.8	69.2	11.9	117.0	51.8	116.8	150.8	247.8
PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	20149 20149-S01	63.01	54.8	45.3	228.6	313.7	157.2	76.2	13.1	128.8	57.0	128.5	166.0	272.7
PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	20149 20149-D01	120.04	104.5	86.3	435.6	597.7	299.5	145.1	24.9	245.4	108.7	244.8	316.3	519.5
HILLSBOROUGH TOWN	HILLSBOROUGH WATER WORKS	20355 20355-S01	120.04	104.5	86.3	435.6	597.7	299.5	145.1	24.9	245.4	108.7	244.8	316.3	519.5
End of Reach North Branch Contoocook R	Confluence with Mainstem Contoocook		120.69	105.0	86.7	437.9	600.9	301.2	145.9	25.0	246.7	109.3	246.2	318.0	522.3



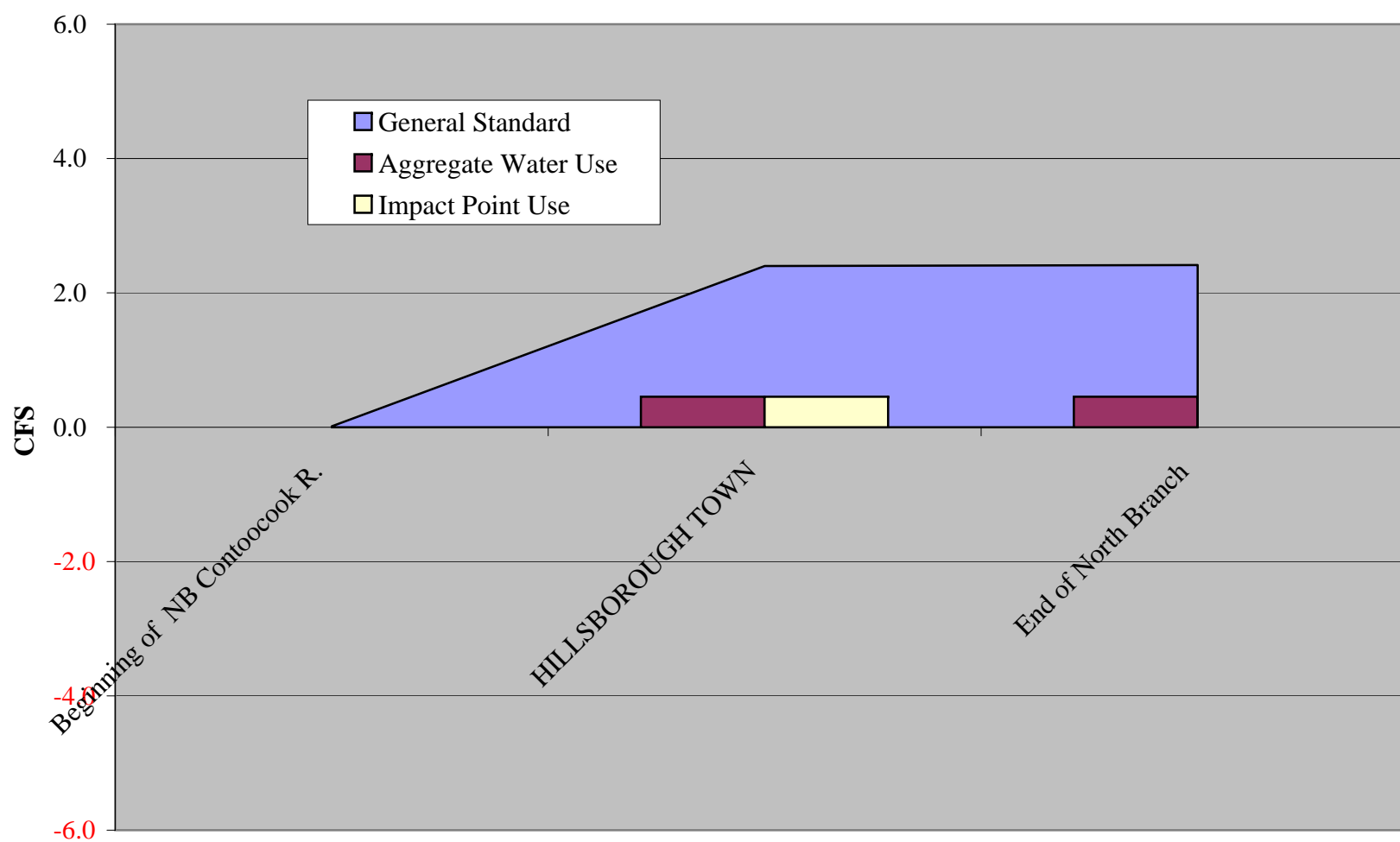
2003 No. Br. Contoocook Estimated Monthly General Standard at Each Impact Point in CFS		USGS 01086000 WARNER RIVER AT DAVISVILLE, NH	General Standard in cfsm													
			146		0.02	0.02	0.04	0.16	0.04	0.04	0.0019	0.04	0.02	0.04	0.04	0.16
WU_NAME	FACILITY	WUSD_ID	DA on DR (SQ MILE)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Beginning of Reach North Branch Contoocook R.	Rye Pond		0.64	0.01	0.01	0.03	0.10	0.03	0.03	0.00	0.03	0.01	0.03	0.03	0.10	
STEELS POND HYDRO	STEELS POND DAM	20604 20604-S01	57.24													
STEELS POND HYDRO	STEELS POND DAM	20604 20604-D01	57.24	1.1	1.1	2.3	9.2	2.3	2.3	0.1	2.3	1.1	2.3	2.3	9.2	
PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	20149 20149-S01	63.01	1.3	1.3	2.5	10.1	2.5	2.5	0.1	2.5	1.3	2.5	2.5	10.1	
PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	20149 20149-D01	120.04	2.4	2.4	4.8	19.2	4.8	4.8	0.2	4.8	2.4	4.8	4.8	19.2	
HILLSBOROUGH TOWN	HILLSBOROUGH WATER WORKS	20355 20355-S01	120.04	2.4	2.4	4.8	19.2	4.8	4.8	0.2	4.8	2.4	4.8	4.8	19.2	
End of Reach North Branch Contoocook R	Confluence with Mainstem Contoocook		120.69	2.4	2.4	4.8	19.3	4.8	4.8	0.2	4.8	2.4	4.8	4.8	19.3	

2003 No. Br. Contoocook Estimated Monthly Margin of the Aggregate Water Use Below the General Standard in CFS															
WU_NAME	FACILITY	WUSD_ID	DA on DR (SQ MILE)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Beginning of Reach North Branch Contoocook R.	Rye Pond		0.64	0.01	0.01	0.03	0.10	0.03	0.03	0.00	0.03	0.01	0.03	0.03	0.10
STEELS POND HYDRO	STEELS POND DAM	20604 20604-S01	57.24												
STEELS POND HYDRO	STEELS POND DAM	20604 20604-D01	57.24	1.1	1.1	2.3	9.2	2.3	2.3	0.11	2.3	1.1	2.3	2.3	9.2
PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	20149 20149-S01	63.01	(115.8)	(30.9)	(104.2)	(274.4)	(105.8)	(97.8)	0.12	(39.2)	(28.7)	(125.9)	(232.5)	(214.2)
PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	20149 20149-D01	120.04	2.4	2.4	4.8	19.2	4.8	4.8	0.23	4.8	2.4	4.8	4.8	19.2
HILLSBOROUGH TOWN	HILLSBOROUGH WATER WORKS	20355 20355-S01	120.04	1.9	1.9	4.3	18.7	4.4	4.4	(0.3)	4.3	2.0	4.4	4.4	18.8
End of Reach North Branch Contoocook R	Confluence with Mainstem Contoocook		120.69	2.0	2.0	4.3	18.9	4.4	4.4	(0.3)	4.4	2.0	4.4	4.4	18.9

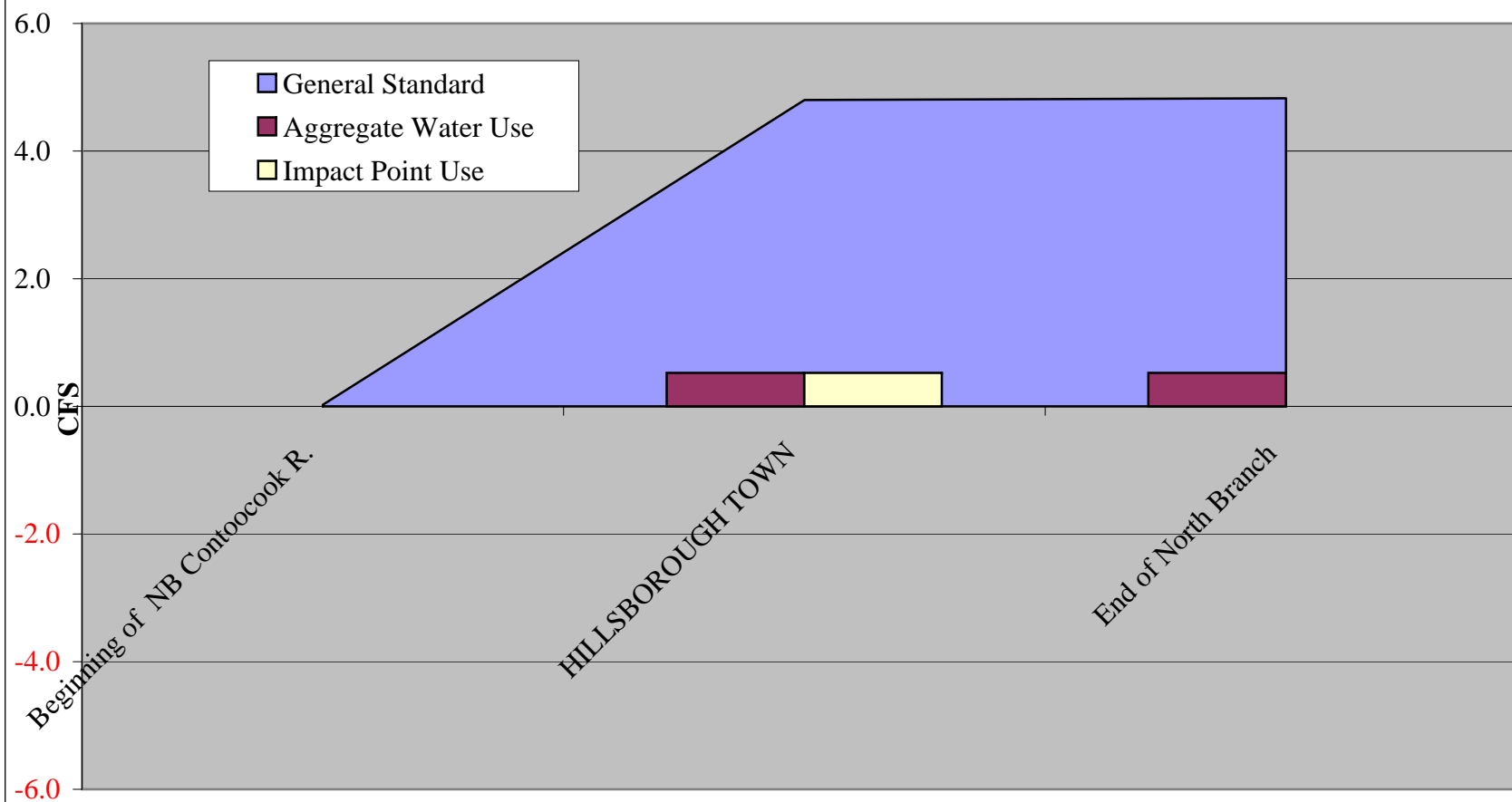
# January 2003 North Branch Contoocook



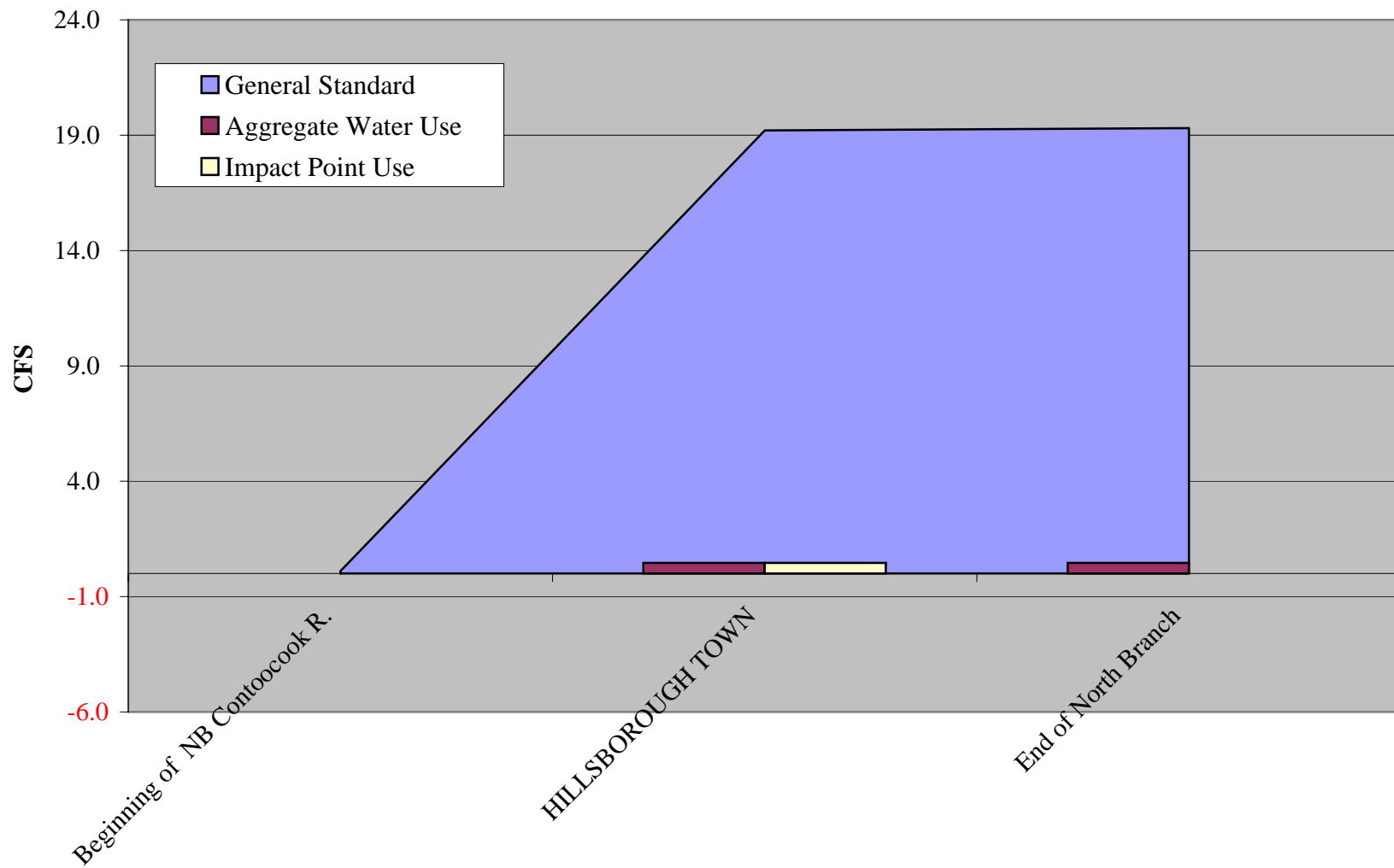
## February 2003 North Branch Contoocook



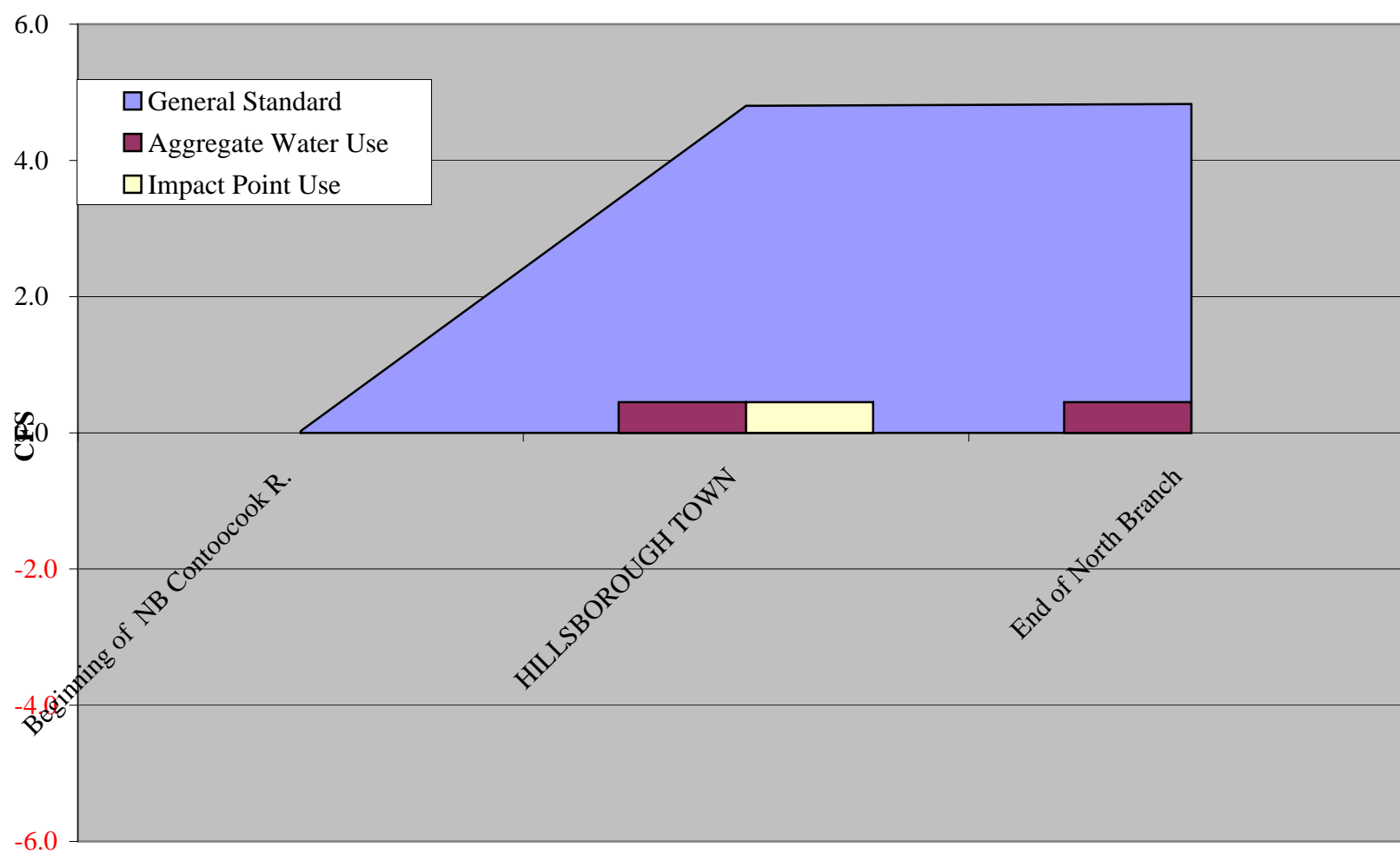
## March 2003 North Branch Contoocook



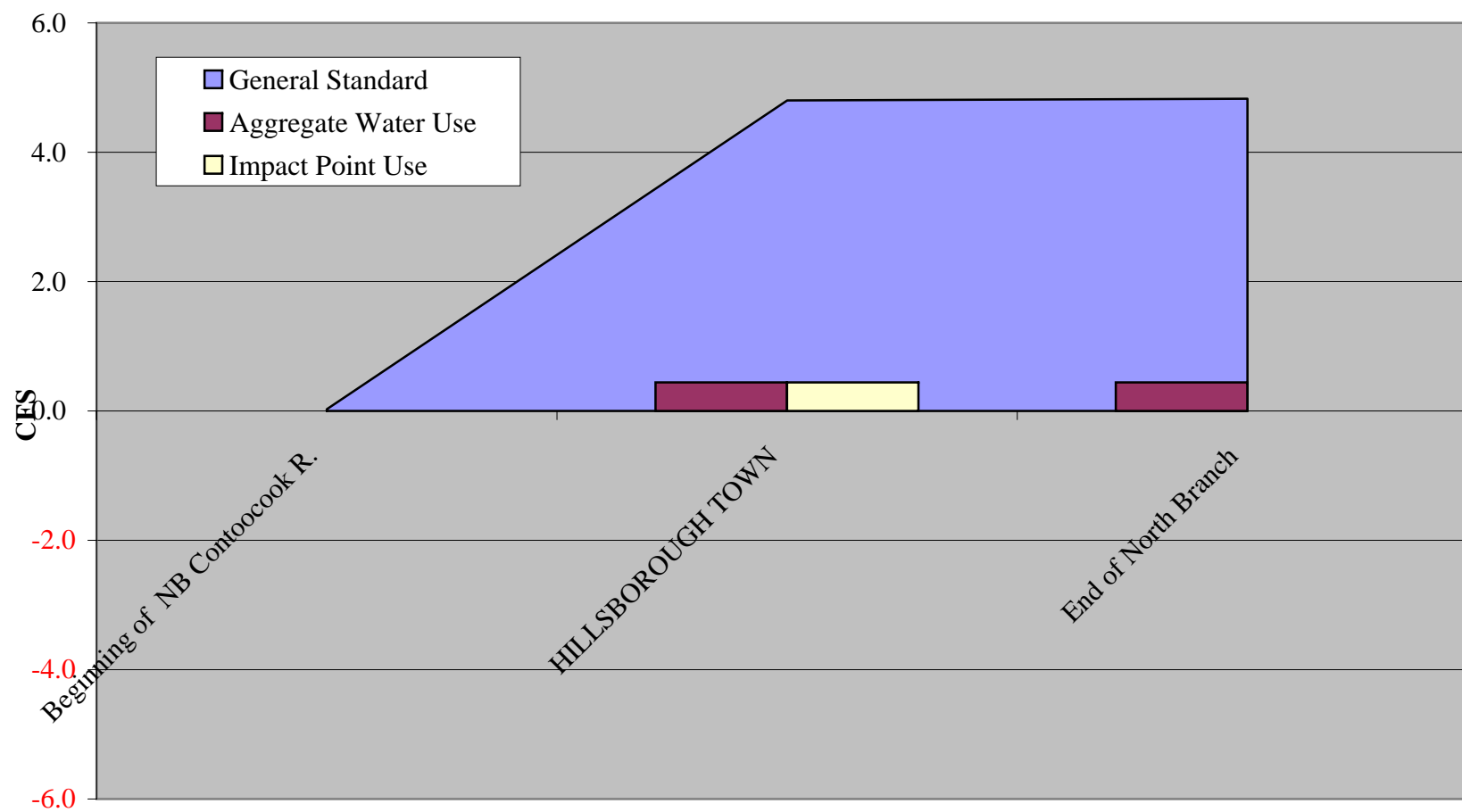
## April 2003 North Branch Contoocook



## May 2003 North Branch Contoocook

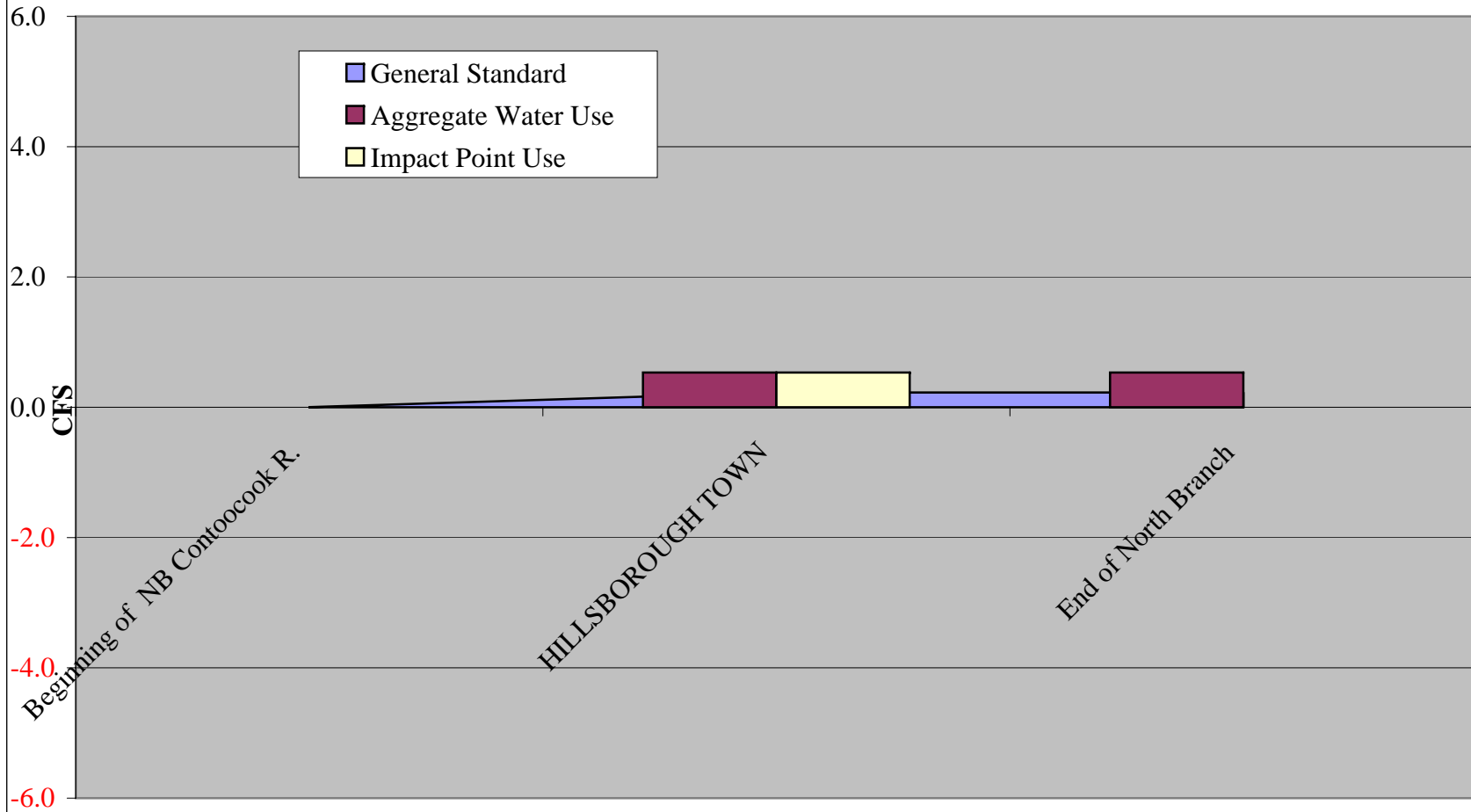


## June 2003 North Branch Contoocook

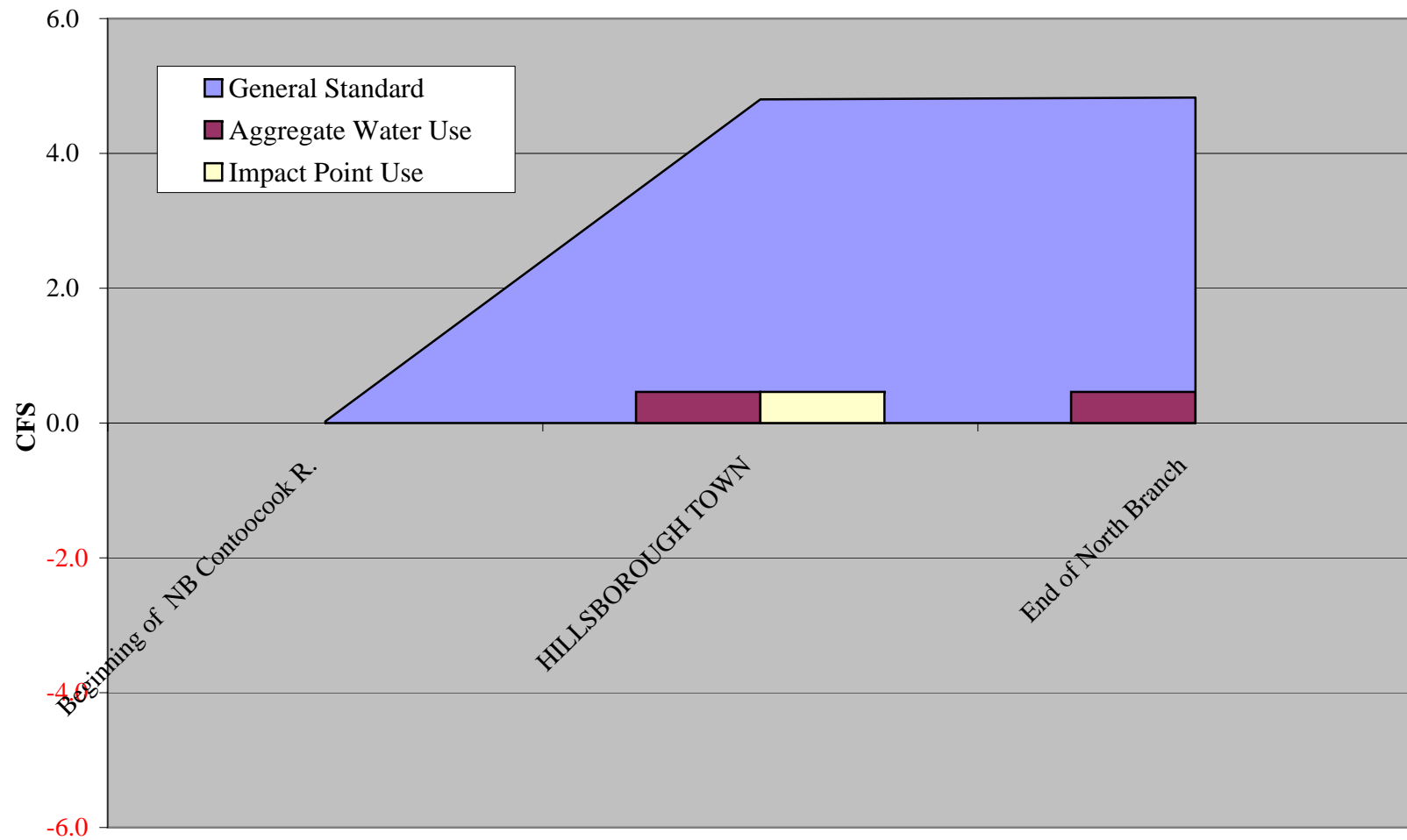




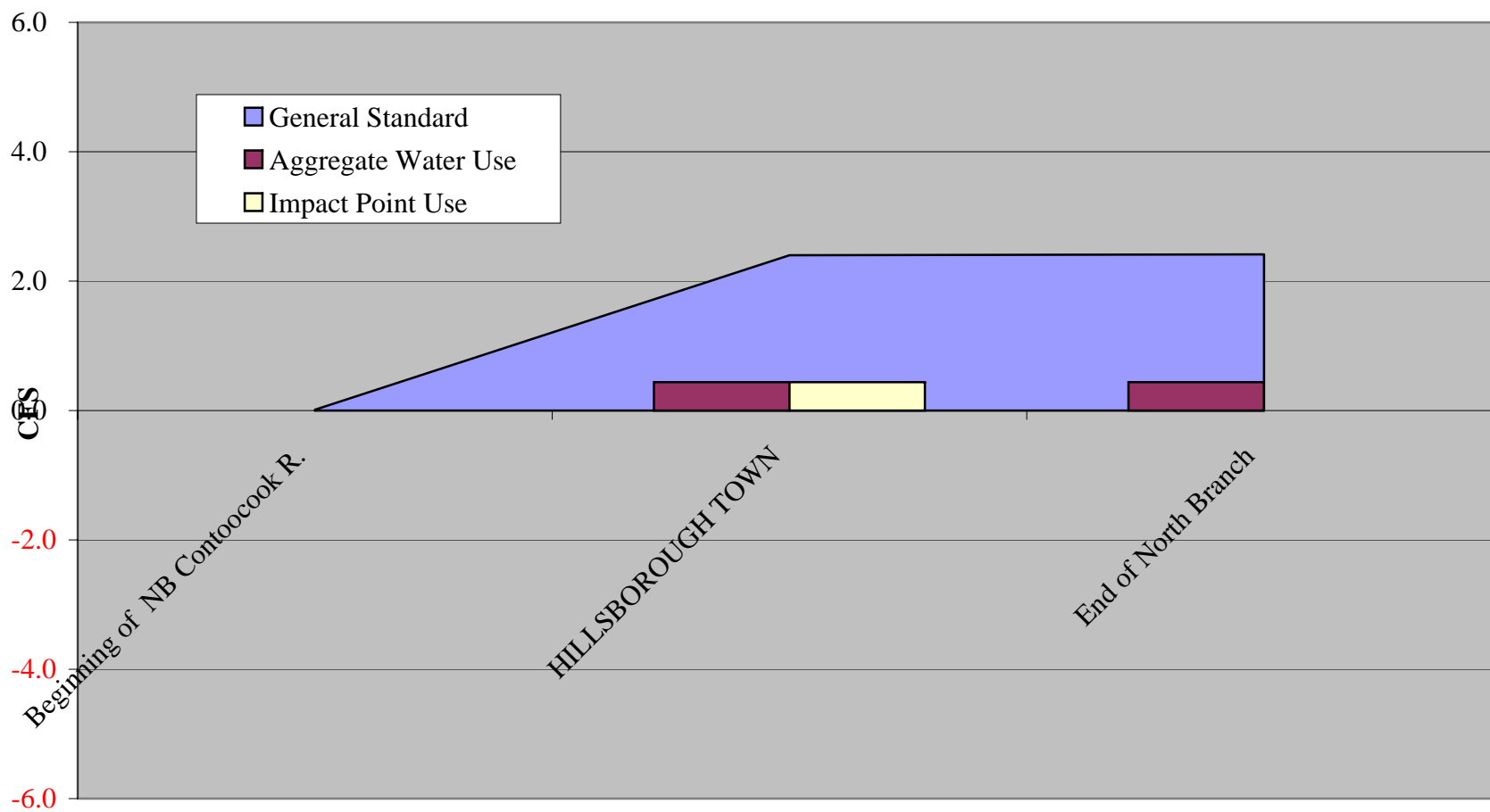
## July 2003 North Branch Contoocook



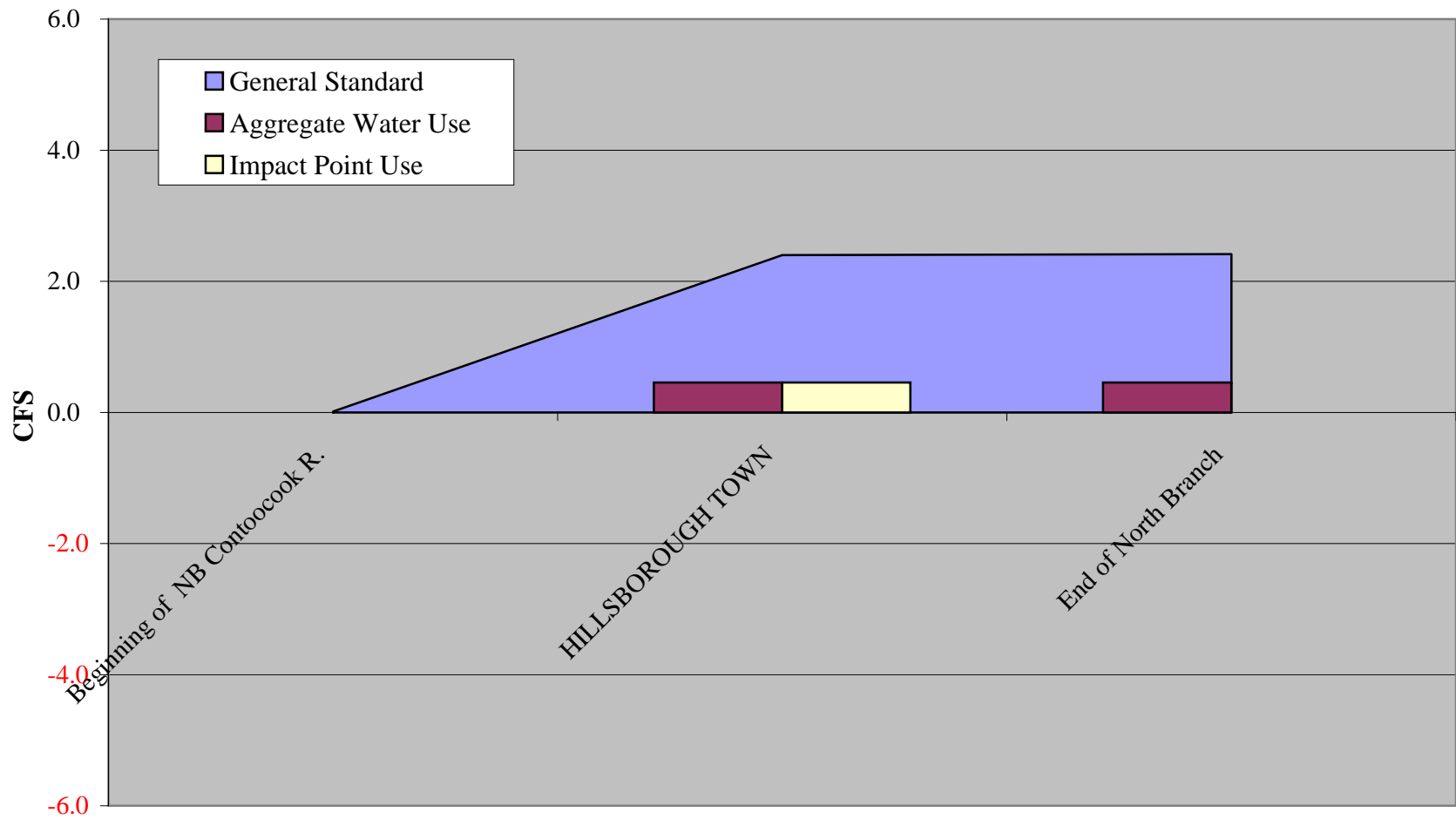
## August 2003 North Branch Contoocook



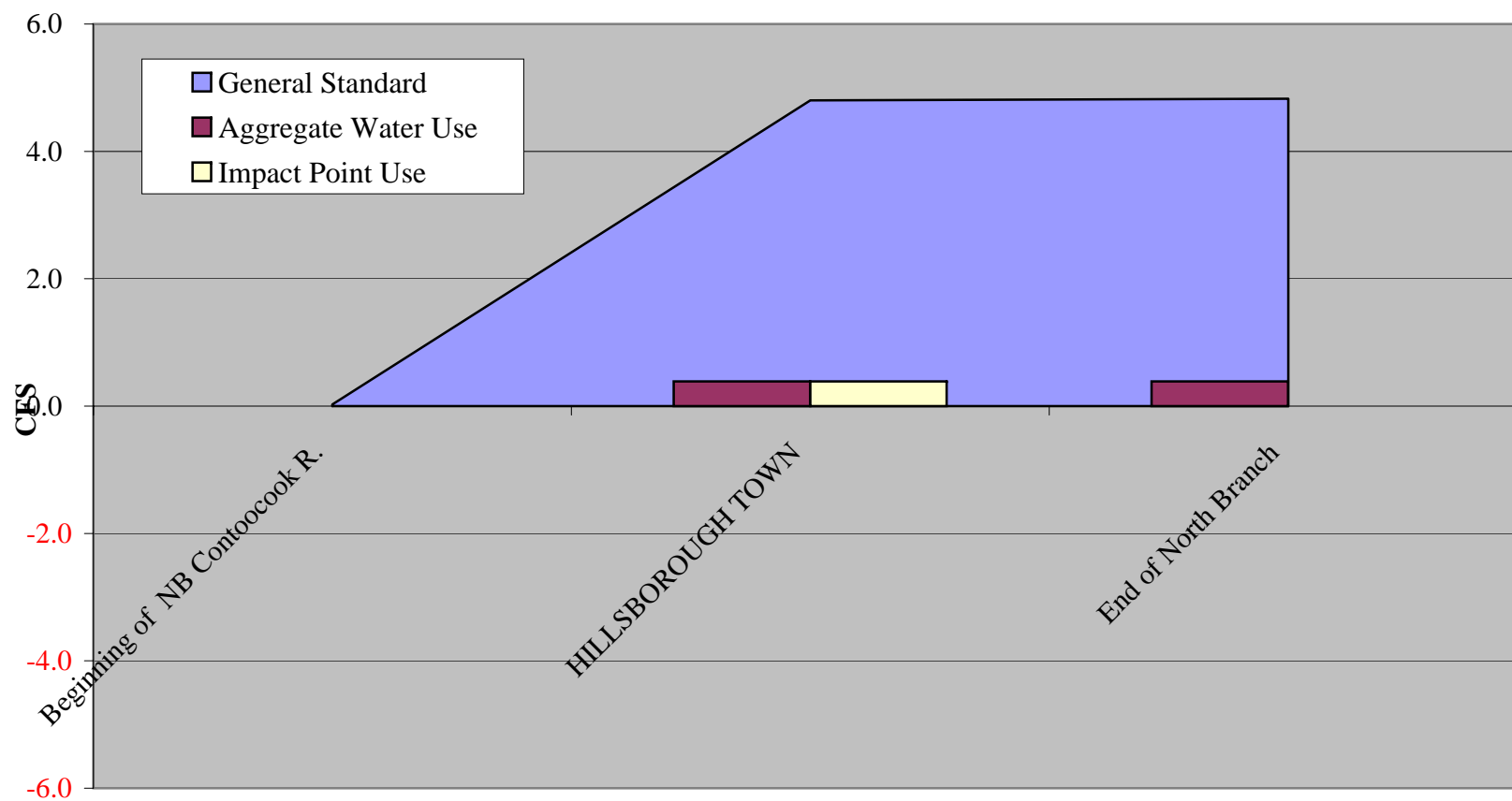
## September 2003 North Branch Contoocook



## October 2003 North Branch Contoocook



## November 2003 North Branch Contoocook



## December 2003 North Branch Contoocook

